



Solution Brief

AI Vision Technology
Retail



Claro360 Uses AI Vision to Help Create Safer Spaces



"This project is a practical and live example of what technology can do for us. We are witnessing how the platform's adoption is being accelerated thanks to Intel® architecture, improving performance as well as accelerating its scalability, creating a positive impact on thousands of end users. This infrastructure allows us to speak a common language and make our processes more efficient."

—Luis Fuentes, CEO of Claro 360

Claro360 rapidly deploys intelligent vision technology to help create safer shopping retail environments

The COVID-19 pandemic caused business closures and economic chaos worldwide. It has made AI an essential tool to help ensure safe operations by monitoring social distancing in order to curtail virus spread and keep businesses open. In a post-pandemic world, social-distancing technology market solutions are expected to reach USD 33.1 billion by 2026.¹ Intelligent, responsive solutions that help businesses maintain compliance will see the largest demand in the enterprise segment. A substantial amount of that growth is expected to occur in retail. Retailers are expected to utilize intelligent monitoring solutions to enhance security as well as customer service through queue detection and activity analysis.

Challenge: Enabling intuitive, near-real-time crowd control solutions to help slow the spread of COVID-19 in the retail sector

Retailers have faced a unique set of obstacles to remain open during the COVID-19 pandemic. Shelter-in-place mandates and occupancy limits have been especially challenging to retailers with limited resources, who must institute safety protocols to help prevent virus spread among customers and associates. The onset of the pandemic hastened many closures and bankruptcies.² Pandemic concerns are predicted to remain top of mind for retailers well into 2026.² The International Monetary Fund reported that the global economy was reduced by 4.4 percent in 2020 due to economic contractions caused by the pandemic. It described the decline as the worst seen since the Great Depression.³

To stay afloat, retailers needed an efficient way to provide safer shopping environments to help stem the spread of COVID-19 while staying compliant with government mandates. They required an intelligent monitoring solution to count shoppers within a specific area and measure the distance between them, track shopper movements, measure total store occupancy, and anticipate problem areas within a store. The solution needed to be near-real time, predictive, economical, and easily deployed using legacy camera monitoring technologies. Intel partner Claro360 stepped up to the challenge in 2020 by implementing the Intel® Xeon® Scalable platform to provide a scalable AI solution for vision applications that created safe spaces for retailers. It was successfully deployed in Latin America. They began the project with 2nd Gen Intel® Xeon® Scalable processors and have since transitioned to 3rd Gen Intel® Xeon® Scalable processors.

Solution: Claro360 uses Intel Xeon Scalable processors to rapidly deploy intelligent vision technologies

The Claro360 platform was uniquely positioned to serve this marketplace with smart video analytics that use legacy video monitoring in a more intelligent way. Intel offers video analytics solutions called Retail Pandemic Reference Implementations based on the Intel® Distribution of OpenVINO™ toolkit. OpenVINO allows developers to optimize, tune, and run comprehensive AI inference using model optimizers, runtime, and development tools. With this technology, Claro360 could rapidly deploy a video analytics solution on the Intel Xeon Scalable platform to help retail partners create safer spaces with intelligent vision AI technology that monitors human behavior and occupancy levels in near-real time with predictive analytics. OpenVINO also enables retargeting to different Intel® processor types to shift workloads depending on future solution architecture requirements.

How it works

The solution uses the Intel Xeon Scalable processor's ability to consume and perform analytics and inference on many video streams. The retail application analyzes captured video sources to count shoppers within a specific area and measure the distance between each shopper. A red bounding box appears, and a visual alert is triggered if the distance between shoppers is less than a specified amount. This allows store management to take appropriate action to correct shopper behavior.

Social distance enforcement

1. A trained neural network detects people in the frame of interest.
2. A person reidentification model extracts features from detected people.
3. The application calculates the distance between people based on each person's location, size, and perspective.
4. A red bounding box identifies shoppers who are closer than the predetermined distance.

See an [example](#) of a multicamera implementation in social distancing detection in retail settings.

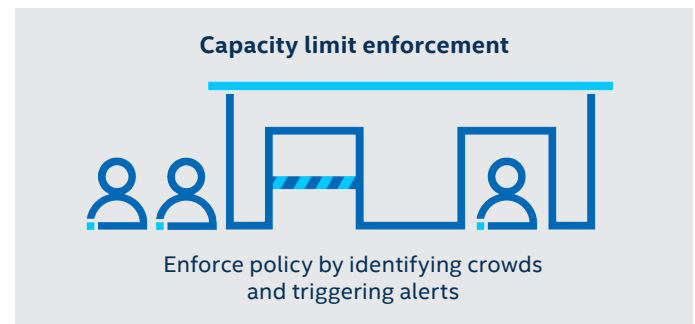


Capacity limit enforcement

The intelligent application allows store management to count people as they enter and leave a store to ensure store occupancy does not exceed a predefined limit. The system anonymously detects people who cross a virtual line and determines if they are entering or exiting the store. The application counts all unique shoppers and displays the current store occupancy.

Using a monitored video source:

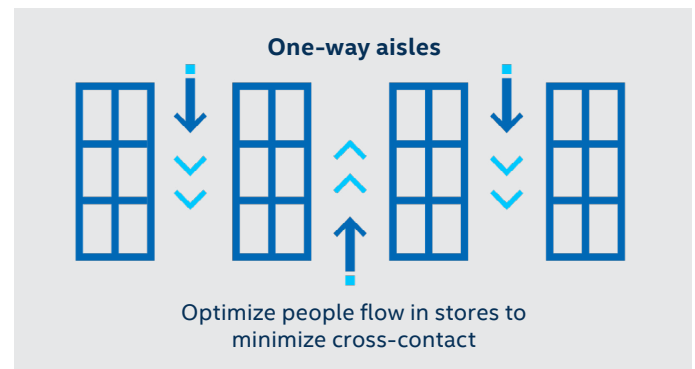
1. A trained neural network detects people in the frame of interest.
2. A person reidentification model extracts features to detect unique shoppers.
3. The application counts individual shoppers entering and leaving the store based on configured virtual gates.
4. The current occupancy and capacity limit are displayed on the screen.



One-way aisles

The intelligent application detects shoppers and determines their walking direction. Store management gets alerts if shoppers go in the opposite direction of predetermined paths.⁵ The application uses the captured video source by:

1. Ingesting video from a file and processing it frame by frame.
2. Using a deep neural network (DNN) model to detect people in the frame of interest.
3. Using a second DNN model and extracting features to determine if detected shoppers go opposite to the preferred direction.



Line monitoring

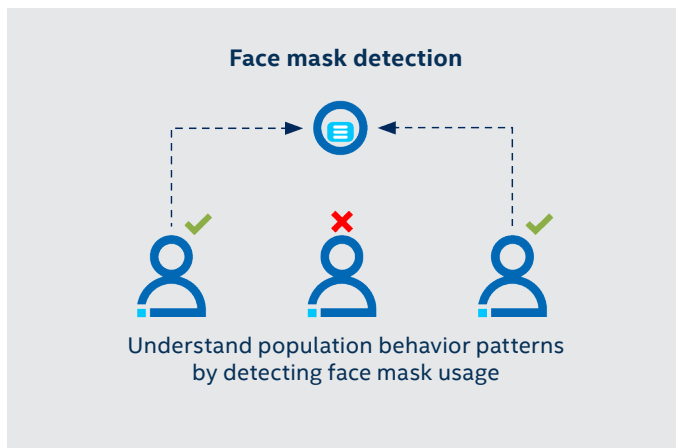
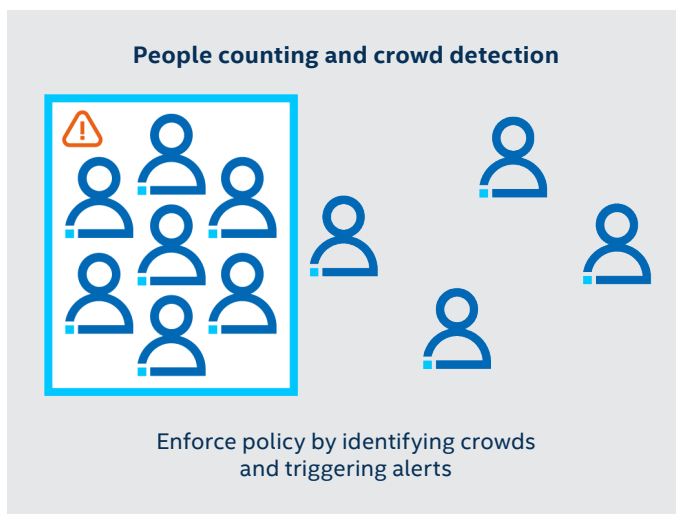
The intelligent application uses near-real-time monitoring to count the number of people waiting in lines and forecasts the line size.⁵ This data can also be used to improve retailers' logistics. The application uses captured video source as follows:

1. A trained DNN model detects people in the frame of interest.
2. The number of people on top of a configured virtual line are counted.
3. The total number of shoppers waiting in line is shown on the screen.



Other vision solutions

The application enforces policy by identifying crowds and triggers alerts when predetermined limits are exceeded. Contact tracing with redaction can also be performed to trace potential spread of diseases. This assists store management in developing plans to minimize the spread.



People counting and crowd detection

The intelligent application detects shoppers who are too close to each other and spots crowds and enforces policies by triggering alerts. Pretrained OpenVINO models can count people, and metadata is sent to a back-end server, but personal data is not stored.

Face mask detection

The intelligent application does comparative analysis and detects people who are wearing masks vs. people who are not wearing masks.

An extensive partner ecosystem benefits retailers

As a partner in the Intel ecosystem, Claro360 was able to swiftly deploy the new retail monitoring solution. That ecosystem was the perfect backdrop for deploying an intuitive video-monitoring solution for retailers, since they include experts in intelligent vision technology. Following the COVID-19 pandemic, managers of the Claro360 solution convened a strategic partnership with the Carlos Slim Foundation through Ecosystem 360. Ecosystem 360, by Claro360, is a broad, scalable, digital ecosystem offering multiple services dedicated to resource optimization and managing companies, organizations, and government activities. Ecosystem 360 began in Mexico and assisted in the rapid response and turnaround time of an intelligent vision technology for local retailers. It quickly expanded to Peru and Columbia and is slated to expand to the rest of Latin America by the end of 2021. Ecosystem 360 can be leveraged to deploy visual analytics use cases that help all businesses improve retail strategies. Potential benefits include:

- **Improved security** with autonomous technology using legacy video cameras for retail/emergency/manufacturing usage.
- **Comprehensive in-store analytics** using zone/area heat mapping, people flow, customer satisfaction product ranking, layout, and marketing campaigns analysis.
- **Loss prevention** through counting of people and high-priced products.
- **Streamlined operations** by remote management, providing cross-sale/emergency/optimization opportunities.
- **Big data analytics** using the Claro360 cloud and services.
- **Lower OpEx** by using legacy infrastructure and making it smart.

Claro360 is expanding beyond the pandemic

Claro360 has solutions underway to expand services well beyond retail. The intelligent platform will be multipurpose, serving retail, government, healthcare, and workplaces. Some example deployments include:

Healthcare

Healthcare has many needs that go beyond disease prevention. In addition to the social distancing component of the Claro360 solution, the platform will offer medical personnel many other options that include:

- A telehealth solution with an intelligent health platform that allows doctors and clinicians to offer remote medical care, diagnostics and patient consultations. It assists in communications, data gathering, and collaborative healthcare between facilities such as hospitals, pharmacies, and insurance companies.

Workplace Transformation

Workplaces will continue to offer employees the option of working remotely for the foreseeable future. The Claro360 solution helps counter challenges of the remote ecosystem by maintaining productivity, interactivity, collaboration, and learning. Claro360 has developed a complete suite of remote working solutions that enhances remote communication through cyber-physical automation. It assists in:

- Communication services, agenda, productivity tools and development environments
- The process integration of suppliers, customers, and partners
- Maintaining the health status of each employee on a daily basis
- Health protocols compliance

Retail

The retail plans for Claro360 go well beyond social distancing monitoring within stores with remote video solutions that will help retail customers place grocery orders remotely and create video meetings for product and service selection. Customers will be able to track order fulfillment and delivery times. The Claro360 Retail Edge AI Services include:

- People detection and counting in stores
- Theft prevention and analysis
- Camera view to floorplan projection
- Trajectories analysis
- Occupancy forecasting



How Intel Xeon processors accelerate AI deployment

Intel Xeon Scalable processors are specifically optimized to run high-performance, deep learning inference so developers can do more at the edge. The 3rd Gen Intel Xeon processors that Claro 360 is now using are based on a new 10nm process and microarchitecture designed for data-intensive workloads, featuring high core counts⁶, expansive I/O, integrated AI acceleration, and enhanced security features to help protect data both at rest and in flight, offering:

- **Improved performance and more cores along with increased memory bandwidth⁷:** Allows for faster object recognition analysis on multiple video streams simultaneously.
- **Decreased system equipment footprint and overall power consumption:** With more density of workloads on servers (more video streams processed per server), the number of dedicated servers is reduced.

- **No architecture change—seamless transition:** Upgrading to the latest processors won't require additional training for development or operations.
- **TCO optimization:** Intel® Speed Select Technology (Intel® SST) is a collection of features that improve performance and optimize TCO by providing more control over CPU performance.
- **AI acceleration:** Intel® AVX-512 and Intel® Deep Learning Boost (Intel® DL Boost), features of the Intel Xeon Scalable processor family, help accelerate AI with new instructions that reduce the computational requirement for complex model training and inference.

Innovation meets performance

Smart video analytics and monitoring solutions powered by Intel® technology will continue to offer businesses the actionable insights they need to make informed, data-driven decisions and logistical improvements for safer, more-efficient work environments. Intel saw the pandemic, the needs that arose, and responded by helping businesses navigate the new challenges in an insightful and beneficial way.

Learn more

Find out more about Claro360 at claro360.com.

Dig deeper into the [reference implementations](#) for social distance, capacity limit, one-way monitoring, and line monitoring.

Intel Distribution of OpenVINO toolkit

The Intel Distribution of OpenVINO toolkit enables developers to optimize, tune, and run comprehensive AI inference using the included model optimizer and runtime and development tools. They can build and deploy high performance computer vision and deep learning inference solutions using the Intel Deep Learning Boost capabilities of Intel Xeon Scalable processors. A trained deep learning model can be converted and optimized from a framework such as Caffe or TensorFlow and be effectively deployed on Intel® hardware.

[Learn more ›](#)

3rd Gen Intel Xeon Scalable processors

Get greater performance, more memory bandwidth, and hardware-enabled security features to enable and enhance your AI and IoT deployments. 3rd Gen Intel Xeon Scalable processors deliver advanced performance, security, efficiency, and built-in AI acceleration to handle IoT workloads and more-powerful AI. IoT SKUs feature long-life availability⁸ for customers with extended procurement or certification cycles.

[Learn more ›](#)



1. Source: <https://www.prnewswire.com/news-releases/global-social-distancing-solutions-market-by-technology-gear-and-applications-2021-2026-general-human-being-tracking-market-is-forecast-to-exceed-9b-by-2026-301174589.html>
2. Source: <https://kenaninstitute.unc.edu/kenan-insight/when-tomorrow-becomes-today-the-impact-of-covid-19-on-accelerating-existing-retailing-trends1/>
3. <https://software.intel.com/content/www/us/en/develop/topics/iot/reference-implementations/retail-pandemic-store-capacity.html>
4. <https://software.intel.com/content/www/us/en/develop/topics/iot/reference-implementations/retail-pandemic-one-way-direction-monitor.html>
5. <https://software.intel.com/content/www/us/en/develop/topics/iot/reference-implementations/retail-pandemic-shopper-line.html>
6. The 3rd Gen Intel® Xeon® Scalable platform offers a maximum of 40 cores/socket; a maximum of 28 cores/socket are offered on the IOTG road map.
7. Maximum memory support of 6 TB is based on all eight memory channels populated with one 256 GB DDR4 DIMM and one 512 GB Intel® Optane™ Memory 200 series DIMM.
8. Intel does not commit or guarantee product availability or software support by way of road map guidance. Intel reserves the right to change road maps or discontinue products, software, and software support services through standard EOL/PDN processes. Please contact your Intel account rep for additional information.

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Intel® Advanced Vector Extensions (Intel® AVX) provides higher throughput to certain processor operations. Due to varying processor power characteristics, utilizing AVX instructions may cause, a) some parts to operate at less than the rated frequency and, b) some parts with Intel® Turbo Boost Technology 2.0 to not achieve any or maximum turbo frequencies. Performance varies depending on hardware, software, and system configuration, and you can learn more at intel.com/go/turbo.

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